

CLAIMS:

1. A tissue puncture closure assembly, comprising:
 - a closure device having a distal and a proximal end;
 - a block and tackle disposed in the closure device and anchored to the proximal end;
 - a first filament extending from the block and tackle;
 - an anchor attached to the first filament at the distal end of the tissue puncture closure device;
 - a sealing plug attached to the first filament between the anchor and the block and tackle.
2. The tissue puncture closure assembly according to claim 1 wherein the block and tackle comprises:
 - a plate having a plurality of holes disposed therein;
 - a second filament anchored to the proximal end of the closure device and looping through at least two of the plurality of holes.
3. The tissue puncture closure assembly according to claim 2 wherein the second filament terminates with a pull-tab extending from the proximal end of the tissue puncture closure device.
4. The tissue puncture closure assembly according to claim 2 wherein the plate further comprises at least two risers to space the second filament looping through the plurality of holes.

5. The tissue puncture closure assembly according to claim 2 wherein the first filament is slidingly attached to the anchor and the sealing plug.

6. The tissue puncture closure assembly according to claim 5 wherein the first filament extends distally from the block and tackle through the sealing plug and the anchor, back proximally toward the block and tackle, and is tied onto itself in a slip knot disposed between the block and tackle and the sealing plug.

7. The tissue puncture closure assembly according to claim 2 wherein the plurality of holes comprises three holes.

8. The tissue puncture closure assembly according to claim 1 wherein the first filament, the sealing plug, and the anchor are biologically resorbable.

9. The tissue puncture closure assembly according to claim 1, further comprising an insertion sheath receptive of the closure device, the insertion sheath comprising a flexible tube with a hemostatic valve at a proximal end and a one-way anchor valve at a distal end.

10. The tissue puncture closure assembly according to claim 9 wherein the one-way anchor valve comprises a fold in the distal end of the flexible tube.

11. An internal incision sealing device comprising:
an internal component configured to be positioned against an internal portion of an incision;
an external component configured to be positioned at an external portion of the incision,
wherein the external component is attached to the internal component by a first slip-knotted filament
such that tension on the first filament compresses the internal component and external component
together; and

a block and tackle disposed within the internal incision sealing device and operatively
connected to the internal and external components.

12. An internal incision sealing device according to claim 11 wherein the block and tackle
creates a mechanical advantage such that the tension on a second filament traversing the block is
multiplied and applied to the first filament, causing the slip knot to slide and compress the internal
and external components together across the incision.

13. An internal incision sealing device according to claim 11, wherein the internal
incision is an arteriotomy.

14. An internal incision sealing device according to claim 11, wherein the second
filament is fixed to a cap of the sealing device at a first end, and free at a second end.

15. An internal incision sealing device according to claim 14 wherein the second end
further comprises a pull-tab.

16. An internal incision sealing device according to claim 14 wherein the block and tackle comprises at least two loops, creating at least a four to one mechanical advantage.

17. An internal incision sealing device according to claim 14, wherein the second filament is fixed to the cap with at least one stop plug.

18. An internal incision sealing device according to claim 11, wherein the internal component is an anchor shaped to advance in a low profile configuration through an insertion sheath, and automatically rotate into an expanded configuration upon exit from the insertion sheath and retraction of the sealing device.

19. An internal incision sealing device according to claim 11, wherein the external component is a collagen sponge.

20. An internal incision sealing device according to claim 11, wherein the internal component, the external component, and the first slip-knotted filament are biologically resorbable.

21. An internal incision sealing device according to claim 11, wherein the first slip-knotted filament is attached or looped through the block and tackle, and ~~threads through the external~~ component, through a hole in the internal component, and is knotted proximal of the external component.

22. An internal incision sealing device according to claim 11, wherein the block and tackle comprises a plate with at least two holes extending through.

23. An internal incision sealing device according to claim 22, wherein the plate has at least two riser portions to prevent interference between loops of a second filament comprising the block and tackle.

24. An arteriotomy sealing device, comprising:

an anchor shaped to advance in a low profile configuration and automatically rotate into an expanded configuration when retracted;

a collagen sponge connected in a loop to the anchor by a biologically resorbable filament; wherein tension on the biologically resorbable filament compresses the collagen sponge and the anchor together; and

a block and tackle operatively connected to the biologically resorbable filament for generating a mechanical advantage.

25. An arteriotomy sealing device according to claim 24 wherein the block and tackle is attached to a cap of the sealing device via a second filament.

26. An arteriotomy sealing device according to claim 25 wherein the second filament is fixably secured to the cap, loops between the block and the cap at least once, and extends out of the cap.

27. An arteriotomy sealing device according to claim 24 wherein the block and tackle comprises a plate with at least two holes extending through.

28. An arteriotomy sealing device according to claim 27, wherein the plate has at least two riser portions to prevent interference between filament loops extending through the block.

29. A method of sealing an internal incision comprising:
inserting an internal component and an external component into the internal incision such that the internal component is positioned against an interior wall of the internal incision and the external component is positioned against an exterior wall of the internal incision;
exerting an initial tension force on a device which translates the initial tension force into a multiplied compression force between the internal component and external component across the internal incision, wherein the device creates a mechanical advantage.

30. A method of sealing an internal incision according to claim 29, further comprising removing any non-biologically resorbable members from a situs of the internal incision, but leaving the internal and external components across the internal incision.

31. A method of sealing an internal incision according to claim 30, wherein the removing further comprises cutting a filament connecting the internal and external components to the device.

32. A method of sealing an internal incision according to claim 29 wherein the internal incision is an arteriotomy.

33. A method of sealing an internal incision according to claim 29 wherein the internal component is an anchor and the external component is a collagen sponge.

34. A method of sealing an internal incision according to claim 29 wherein inserting the internal and external components into the internal incision further includes:

extending a guidewire through the internal incision;

passing an insertion sheath over the guide wire and into the internal incision;

removing the guidewire;

inserting a sealing device into the insertion sheath and into the internal incision;

retracting the sealing device to anchor the internal component against the interior wall of the internal incision.

35. A method of sealing an internal incision according to claim 29 wherein exerting the initial tension force on the device which translates the initial tension force into a magnified compression force between the internal component and external component over the internal incision further includes:

locating a filament that extends between a block and tackle and a cap, and extends out proximally from the cap, wherein the filament loops around the block at least twice; and

exerting an outward force on the filament, wherein the block and tackle is attached to the internal and external components via a biologically resorbable filament in a manner that the outward force on the block and tackle is translated into a compression force between the internal component and external component.

36. A method of sealing an internal incision according to claim 30 wherein removing non-biologically resorbable members further includes:

locating a biologically resorbable filament that connects a block and tackle to the internal component and external components;

severing the biologically resorbable filament between the block and tackle component and the external component; and

retracting a sealing device and the block and tackle.

37. A method of sealing an internal incision according to claim 30 wherein removing non-biologically resorbable members further includes:

severing a filament extending between a block and tackle component and a cap;

removing a sealing device from the internal incision; and

removing portions of the filament that remain in the block and tackle.